

(19)



(11)

EP 2 175 711 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
27.06.2012 Bulletin 2012/26

(51) Int Cl.:
A01D 46/28 (2006.01) **A23N 15/02** (2006.01)
A23N 15/00 (2006.01) **B07B 1/12** (2006.01)

(21) Application number: **08786452.6**

(86) International application number:
PCT/EP2008/059791

(22) Date of filing: **25.07.2008**

(87) International publication number:
WO 2009/016115 (05.02.2009 Gazette 2009/06)

(54) **SEPARATOR DEVICE AND CLEANING SYSTEM FOR A STREAM HARVESTED BY A FRUIT HARVESTING MACHINE**

TRENNVORRICHTUNG UND REINIGUNGSSYSTEM FÜR EINEN VON EINER
OBSTERNTEMASCHINE GEERNTETEN STROM

DISPOSITIF DE SÉPARATEUR ET SYSTÈME DE NETTOYAGE POUR UN FLUX RÉCOLTÉ PAR
UNE MACHINE DE RÉCOLTE DE FRUIT

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(30) Priority: **31.07.2007 FR 0705598**

(43) Date of publication of application:
21.04.2010 Bulletin 2010/16

(73) Proprietor: **CNH France S.A.
91150 Morigny-Champigny (FR)**

(72) Inventor: **BERTHET, Jean-Paul
F-85220 La Chaize Giraud (FR)**

(74) Representative: **CNH IP Department
CNH Belgium NV
Patent Department
Leon Claeyssstraat 3A
8210 Zedelgem (BE)**

(56) References cited:
**EP-A- 1 192 850 FR-A- 2 589 371
FR-A- 2 795 599 FR-A- 2 859 074**

EP 2 175 711 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The invention relates to a device for separating a harvested stream, a cleaning system including such a separation device, and a harvesting machine including such a cleaning system.

[0002] The invention applies to the field of mechanised harvesting of fruit growing on trees or bushes, such as grapes, berries, coffee berries, olives and other fruit, in particular growing in bunches.

[0003] The fruit is conventionally harvested by a shaker system that straddles a row of plants to detach the harvest. The harvested crop stream obtained is then conveyed into the machine to be stored in at least one hopper provided for this purpose or in a trailer driven by.

[0004] However, because of the action of the shaker system, the harvested crop stream includes, in addition to detached fruit, and among other things, juice, leaves, wood particles, bunches of fruit of various sizes. To eliminate components other than fruit, in particular leaves and wood particles, harvesting machines include a cleaning system which is adapted to eliminate said components from the stream by suction before storage.

[0005] In particular, an aspiration or suction device can be disposed above the conveyor transporting the harvested stream from the shaker system to the storage facility. However, the problem then arises of adjusting the suction force to remove from the stream as many components without fruit as possible, and to do this without eliminating the harvested fruit and juice.

[0006] To solve this problem it has been proposed to equip these machines with a device for separating the harvested stream into two layers, respectively a top layer containing components of greater size, especially components other than fruit, and a bottom layer containing detached pieces of fruit and juice. Accordingly, as the suction device faces the top layer, the probability of sucking up components from the bottom layer is reduced.

[0007] Patent applications EP-1 192 850 and EP-1 336 333 propose to effect this separation by means of a conveyor equipped with elongate members that are fixed at the upstream end with an intermediate spacing allowing components of the bottom layer to pass between them. Accordingly, separation is effected by feeding the harvested stream upstream of said elongate members, then displacing said stream along the members over a sufficient length to complete said separation, and then ejecting the top and bottom layers in the downstream portion above which the suction device is placed.

[0008] In this arrangement the separation members on the machine are subjected to mechanical loads during harvesting, especially vibratory loads. Accordingly, the downstream ends of the members being free, the problem arises of holding said members in position to maintain a spacing between them that is adapted to retain the components of the top layer.

[0009] This problem is all the more critical in the case of a small harvesting machine in which the space avail-

able prevents the incorporation of a separator device, said device being fed by two conveyors coming from the shaker system. To complete separation, it is then necessary to use longer members, which increases the risk of relative displacement thereof.

[0010] The invention aims to improve on the prior art by in particular proposing a separator device including lengthwise separator members that are fixed to guarantee that their spacing is maintained under mechanical loads, this being achieved without forming any obstacle to the harvested stream transported by said device.

[0011] To this end, a first aspect of the invention proposes a device for separating a harvested stream, said device being intended to be mounted in a fruit harvesting machine, said device including a frame and longitudinal separator members that are fastened longitudinally to said frame and spaced transversely from each other to form an array for separating the crop stream between a portion retained on said array and a portion passing through said array, said device further including a conveyor belt that is driven in a longitudinal direction between an upstream roller and a downstream roller fastened to said frame, said belt being disposed under the separator members to form between the belt and the members a space for receiving the portion passing through, said belt being provided with teeth having a base part that extends into the receiving space and a projecting part that extends above the separator members, passing through the spaces formed between said members, the separator members being restrained relative to the frame, adjacent the upstream roller, by affixing said members to the frame, characterised in that, ahead of said upstream roller, the separator members are restrained relative to the frame by a rotary member mounted on the frame, said member including paddles that are adapted to hold the separator members in position on rotation of said member.

[0012] A second aspect of the invention proposes a system for cleaning a harvested stream including a separator device of the above kind, said system further including a downstream suction device that is disposed over the separator device to suck up at least some of the retained stream portion.

[0013] A third aspect of the invention proposes a fruit harvesting machine including a motorised support structure and a harvesting system mounted on said structure, said harvesting system being adapted to detach the harvest, said machine further including a cleaning system of the above kind, said system being fed with a harvested stream coming from the harvesting system.

[0014] Other objects and advantages of the invention will become apparent in the course of the following description, which is given with reference to the appended figures, in which:

- Figure 1 is a perspective view of an embodiment of a separator device of the invention;
- Figure 2 is a perspective view of a cleaning system including the separator device shown in Figure 1;

- Figures 3 is a view in longitudinal section of a cleaning system that is a variant of that shown in Figure 2;
- Figure 3a is a view in section taken along the line B-B in Figure 3.

[0015] In the context of this description, terms such as "front" and "back" are defined relative to the direction of transport of the crop on the conveyor belt.

[0016] The invention relates to a machine for harvesting fruit in bunches, in particular a harvester for mechanised harvesting of grapes, notably for subsequent vinification thereof. A harvester conventionally includes a motorised support structure that is equipped with a driver station and a harvesting system mounted on said structure.

[0017] The grape harvester is designed to straddle at least one row of vines in order, as it moves, to introduce the vine stems successively into the harvesting system that is adapted to detach the harvest. To this end, the harvesting system includes vine shakers, in particular a set of shakers provided on either side of the space into which the vine stems are introduced.

[0018] The harvester also comprises a system for continuous recovery of the detached harvest, which comprises, in addition to detached grapes, and among other things, juice, leaves, wood particles, bunches of various sizes. In one embodiment, the system comprises two bucket conveyors adapted to recover the detached harvest under the introduction space and to convey said harvest into the upper portion of the harvester.

[0019] In the context of the vinification of grapes, it is desirable to eliminate components other than fruit beforehand, in particular as soon as harvested. Furthermore, it can be desirable to destem (debunch) harvested grapes to eliminate stalks and therefore to store only grapes and juice.

[0020] The harvester comprises a system for cleaning the harvested stream fed by the bucket conveyors to eliminate components other than fruit, especially leaves and wood particles. In particular, a small harvester can carry a single cleaning system that is fed with harvested streams by two bucket conveyors. Alternatively, two cleaning systems can be installed on the harvester and fed by a respective bucket conveyor.

[0021] One embodiment of a system of the invention for cleaning the harvested stream is described hereinafter with reference to the figures, said system including a device for separating the harvested stream into two layers as a function of the size of the components of said stream..

[0022] Figure 1 shows the separator device, which includes a frame 1 intended to be attached to the harvester; in particular the frame 1 can be attached in an upwardly inclined configuration to enhance separation. The separator device also includes longitudinal separator members 2 onto which the harvested stream coming from the bucket conveyors is fed.

[0023] In the embodiment shown, the separator mem-

bers 2 are formed of rods formed as a prism or a body of revolution, in particular a cylinder. Because the stream contacts the separator members 2, these are preferably made from a corrosion-resistant material, in particular a stainless metal or a synthetic material.

[0024] The separator device further includes a conveyor or belt 3 (Figure 3) that is driven in a longitudinal direction between an upstream roller 4 and a downstream roller 5 attached to the frame 1. In Figure 1, the conveyor includes a motor 6 driving the upstream roller 4.

[0025] The separator members 2 are fastened longitudinally to the frame 1 and transversely spaced relative to each other to form an array 7 intended to separate the stream into a portion retained by said array and a portion passing through said array. In the embodiment shown, the members 2 are fixed by means of a fixture plate 8 surmounted by a clamping plate 9 to form cavities that receive the ends of respective members 2.

[0026] The lateral spacing between the separator members 2 is such that the retained portion includes leaves, wood particles and large bunches or parts of bunches, for example bunches of more than three berries. Consequently, the portion that passes through includes juice and quasi-detached berries, i.e. individual berries or small bunches of berries.

[0027] To define their lateral spacing, the separator members 2 are fixed to the frame 1 in the desired position. Furthermore, the fixing is effected beyond the upstream roller 4 so that the surface of the separator array 7 remains free for transporting the harvested crop stream. Furthermore, to enhance the resulting separation, the downstream, free ends of the rods 2 are alternately offset in the longitudinal direction.

[0028] The conveyor belt 3 is disposed under the separator members 2 providing a space 10 underneath them for receiving the portion passing through. To allow the portion passing through to be conveyed as far as the downstream roller 5, the belt is made from an impermeable material and is accommodated between two walls 1 a, 1 b of the frame 1 to form a sealed conveyor bed for that portion in the receiving space 10.

[0029] The belt 3 is also provided with teeth 11 having a base part 11 a that extends into the receiving space 10 and a projecting part 11 b that extends above the separator members 2, passing through the spaces between said members. In the embodiment shown, the belt 3 is provided with rows of teeth 11 that extend transversely the full width of the separator array 7, the teeth 11 of a row having a common base part 11 a. Accordingly, by compartmentalising the space 10 for receiving the portion that passes through, each base part 11 a improves the conveying of said portion to the downstream roller 5.

[0030] Moreover, the projecting parts 11 b interact with the retained crop portion on the separator members 2 and convey it to the downstream roller 5, separation being accomplished while moving the retained portion over the separator array 7. Thus at the downstream roller 4, the layer that is retained on the array 7 primarily contains

components larger than the spaces between the members 2 and the bottom layer contains the other components.

[0031] However, depending in particular on the volume of the stream to be separated, it may be necessary to provide longer separator members 2 in order to increase the separation distance over which the stream is moved. The length of the separator members 2 can typically exceed 1.2 meters.

[0032] To prevent relative dislocation of the separator members 2, in particular as a result of vibrations and the effects of the mechanical load caused by the harvest, said members are further restrained, ahead of the upstream roller 4, by a rotary member 12 mounted on the frame 1.

[0033] The member 12 includes paddles 13 which are adapted to be rotated by interaction with the projecting parts 11 b of the teeth 11. The tips of the paddles 13 are engaged by the teeth 11. This interaction contributes to holding the separator members 2 in position because the paddles 13 then cyclically limit the possible movement of said members relative to the belt 3 and the frame 1. In a variant that is not shown, the rotary member 12 can be driven in rotation at the same peripheral speed as the belt 3, the paddles 13 then no longer needing to interact with the teeth 11 to cause rotation of the member 12.

[0034] In combination with the teeth 11, which provide downward retention of the separator members 2, the paddles 13 provide upward retention, with no risk of jamming since the superior part of the separator array 7 offers no obstacles to the movement of the retained stream portion.

[0035] In the embodiment shown, the rotary member 12 includes a shaft 14 each end of which is mounted on an upper bearing wall 15 of the frame 1 through a respective bearing 16, said shaft being freely rotatable. Each paddle 13 is formed by a flap, for example of semi-rigid impermeable material, that is associated radially with the shaft 14, for example by bolting it to a corresponding support surface 17 formed on the shaft 14.

[0036] The ends of the paddles 13 are provided with an alternating succession of notches 13a and tabs 13b, produced by cutting the flap, for example. The succession is such that the notches 13a can embrace a respective separator member 2 and the tabs 13b can be disposed in a respective space formed between said members. The rotation of the member 12 is therefore caused by the projecting parts 11 b engaging the tabs 13b and, during rotation, the notches 13a embrace the separator members 2 to hold them in position. In the embodiment shown, the numbers of tabs 13b and projecting parts 11 bare exactly the same so that they can be disposed facing each other.

[0037] Furthermore, the angular distance between the paddles 13 is such that the length of the arc between two adjacent paddles is equal to the distance between two adjacent rows of teeth 11. In this embodiment, each row of teeth 11 therefore successively engages a paddle 13.

Moreover, to improve this engaging effect, the projecting parts 11 b are inclined to have an angle of attack on the tabs 13b that is oriented toward the paddles 13.

[0038] There is described hereinafter with reference to Figures 2 and 3 a cleaning system further including a downstream suction device 18 that is disposed over the separator device to suck up at least some of the retained stream portion.

[0039] The suction device 18 is provided particularly to suck up leaves and wood particles, but not grape bunches, the components sucked up being thereafter ejected through a lateral chute 19 provided for this purpose. Furthermore, because of the preceding separation, leaves sucked up have not been greatly wetted by juice, which greatly reduces their weight and thereby facilitates sucking them up. Thus apart from the fact that they are under the aspirated portion, the probability of sucking up juice and grapes can be reduced by limiting the suction force necessary for cleaning.

[0040] In the embodiment shown, the downstream suction device 18 is behind the rotary member 13 and in the vicinity of the downstream roller 5, to suck up the retained portion at the end of separation. Furthermore, the separator device can be adapted to suck up the retained portion just behind the downstream roller 5, for example where said portion is projected from the separator device.

[0041] The hopper 20 for feeding the separator device with the harvested stream is described with reference to Figures 3 and 3a, said hopper being associated with the frame 1 in the vicinity of the upstream roller 4 to cause the crop stream to drop from the bucket conveyors onto the separator members 2. The hopper 20 is made from bent sheet metal to have an appropriate three-dimensional geometry, in particular to have lower edges that are associated with corresponding mounting surfaces of the frame 1.

[0042] In this embodiment, the cleaning system includes a further, upstream suction device 21 adapted to suck up a portion of the stream fed by the hopper 20. Thus, during feeding, some of the undesirable components can already be eliminated so as not to overload the separator array 7 and thereby to increase cleaning efficiency accordingly.

[0043] To this end, the hopper 20 has a front opening 22 at the bottom in which the suction intake of the upstream device 21 is disposed, said opening being equipped with a shredder 23 to facilitate aspiration and ejection via a rear chute 24 provided for this purpose.

[0044] In the embodiment shown, the hopper 20 includes two upper areas 25 onto which respective bucket conveyors tip the harvested stream, each area 25 being formed on either side of the separator array 7. The wall vertically in line with said areas is equipped with a ramp 26 formed by cutting out and raising a portion of said wall.

[0045] In this embodiment, each of the crop streams descending from the tipping area 25 is raised by a ramp 26, which produces a wave effect when the streams meet

up on the separator array 7. This hence raises the lighter components, in particular leaves and wood particles, which facilitates their aspiration by the upstream device 21. Moreover, the cutouts 27 formed under the ramp 26 enable circulation of air in the hopper 20, which is beneficial to the operation of the upstream suction device 21.

[0046] The harvesting machine equipped with the cleaning system described above has the advantage of delivering a very clean harvest, which can be stored directly in a hopper provided below the area of ejection of the crop stream portions. In this embodiment, the portion of the stream that passes through and the portion of the stream that is retained after aspiration are therefore tipped directly into the hopper.

[0047] In another embodiment, the harvesting machine can be equipped with a destemming system that separates berries from stalks, to store only separated berries and juice. The destemming system can be implemented in accordance with the document EP-1 002 467.

[0048] The invention also provides for the destemming system to include a separator device as described hereinabove. By adjusting the spacing between the separator members, the device can separate individual berries. Furthermore, separation can be encouraged by shaking the frame 1 or by the action of a motorised member such as the rake described in the document referred to above.

[0049] A variant of the destemming system can be fed only with the stream portion retained after aspiration, with the portion that passes through the separator member array being stored directly, because it includes only quasi-detached berries and juice. To this end, a conveyor can be provided under the ejection area for the portion of the stream that passes through, to direct it into the storage hopper.

[0050] In another variant, the two stream portions can be mixed on leaving the cleaning system to feed the destemming system with the whole of the cleaned harvested stream.

Claims

1. A device for separating a harvested crop stream, said device being intended to be mounted in a fruit harvesting machine, said device including:

a frame (1) and longitudinal separator members (2) that are fastened longitudinally to said frame and spaced transversely from each other to form an array (7) for separating the crop stream between a portion retained on said array and a portion passing through said array; and a conveyor belt (3) that is driven in a longitudinal direction between an upstream roller (4) and a downstream roller (5) fastened to said frame, said belt being disposed under the separator members (2) to provide between the belt and the members a space (10) for receiving the por-

tion passing through, said belt being provided with teeth (11) having a base part (11 a) that extends into the receiving space (10) and a projecting part (11 b) that extends above the separator members (2), passing through the spaces formed between said members, the separator members (2) being restrained relative to the frame (1), adjacent the upstream roller (4), by affixing said members to the frame (1), **characterised in that**, ahead of said upstream roller, the separator members (2) are restrained relative to the frame (1) by a rotary member (12) mounted on the frame (1), said member including paddles (13) that are adapted to hold the separator members in position on rotation of said member (12).

2. A separator device according to claim 1, **characterised in that** the paddles (13) are driven in rotation by interaction with the projecting parts (11b) of the teeth (11).
3. A separator device according to claim 1 or 2, **characterised in that** the end of the paddles (13) is provided with an alternating succession of notches (13a) and tabs (13b), said succession being such that the notches (13a) can embrace a respective separator member (2) and the tabs (13b) can be disposed in a respective space between said members.
4. A separator device according to claim 3, **characterised in that** the rotary member (12) includes a shaft (14) each end of which is mounted on the frame (1) by means of a respective bearing (16), each paddle (13) being formed of a flap radially associated with the roller (14).
5. A separator device according to any of the preceding claims, **characterised in that** the belt (3) is provided with rows of teeth (11) that extend transversely over the full width of the separator array (7).
6. A separator device according to claim 5, **characterised in that** the angular offset between the paddles (13) is such that the length of the arc formed between two adjacent paddles is equal to the distance between two adjacent rows of teeth (11).
7. A separator device according to claim 5 or 6, **characterised in that** the teeth (11) of a row have a common base part (11a) compartmentalising the space (10) for receiving the crop portion passing through.
8. A separator device according to any of the preceding claims, **characterised in that** the projecting parts (11 b) have an angle of attack oriented toward the paddles (13).

9. A separator device according to any of the preceding claims, **characterised in that** the separator members (2) are formed of rods having a circular section.
10. A separator device according to claim 9, **characterised in that** the ends of the rods adjacent the downstream roller (5) are alternately offset longitudinally.
11. A separator device according to any of the preceding claims, **characterised in that** the space (10) for receiving the portion passing through is adapted to form a sealed conveyor bed as far as the downstream roller (5) of said portion.
12. A system for cleaning a harvested stream including a separator device according to any of the preceding claims, said system further including a downstream suction device (18) that is disposed over the separator device for sucking up at least some of the retained crop stream portion.
13. A cleaning system according to claim 12, **characterised in that** it further includes a hopper (20) for feeding the harvested crop stream to the separator device.
14. A cleaning system according to claim 13, **characterised in that** it includes an upstream suction device (21) adapted to aspirate part of the crop stream fed by the hopper (20).
15. A cleaning system according to claim 14, **characterised in that** the upstream suction device (21) is provided behind the rotary member (12).
16. A cleaning system according to any of the claims 13 to 15, **characterised in that** the hopper (20) includes at least one front opening (22) in which the suction intake of the upstream suction device (21) is disposed, said opening being equipped with a shredder (23).
17. A cleaning system according to any of the claims 13 to 16, **characterised in that** the hopper (20) includes at least one upper crop tipping area (25), the wall below said area being provided with a ramp (26) formed by cutting and raising part of said wall.
18. A fruit harvesting machine including a motorised support structure and a harvesting system mounted on said structure, said harvesting system being adapted to detach the crop, said machine further including a cleaning system according to any of the claims 13 to 17, said system being fed with a harvested stream coming from the harvesting system.
19. A fruit harvesting machine according to claim 18, **characterised in that** it includes a hopper into which

the crop stream portion passing through and the stream portion retained after aspiration are tipped.

20. A fruit harvesting machine according to claim 18, **characterised in that** it further includes a destemming system fed with at least the stream portion retained after aspiration.
21. A fruit harvesting machine according to claim 20, **characterised in that** the destemming system comprises a separator device according to any of claims 1 to 11.

Patentansprüche

1. Vorrichtung zum Trennen eines Erntematerial-Stromes, wobei die Vorrichtung zur Befestigung auf einer Frucht-Erntemaschine bestimmt ist, wobei die Vorrichtung Folgendes einschließt:

einen Rahmen (1) und längsgerichtete Trennbauteile (2), die in Längsrichtung an dem Rahmen befestigt und in Querrichtung mit Abstand voneinander angeordnet sind, um eine Anordnung (7) zum Trennen des Erntematerial-Stromes in einen Teil, der auf der Anordnung gehalten wird, und einen Teil aufzutrennen, der durch die Anordnung hindurch gelangt; und ein Förderband (3), das in einer Längsrichtung zwischen einer stromaufwärts gelegenen Walze (4) und einer stromabwärts gelegenen Walze (5) angetrieben wird, die an dem Rahmen befestigt sind, wobei das Förderband unter den Trennbauteilen (2) angeordnet ist, um zwischen dem Riemen und den Bauteilen einen Raum (10) zur Aufnahme des hindurch gelangenden Teils zu schaffen, wobei das Förderband mit Zähnen (11) versehen ist, die einen Basisteil (11 a), der sich in dem Aufnahmebereich (10) erstreckt, und einen vorspringenden Teil (11 b) aufweisen, der sich über die Trennbauteile (2) hinaus erstreckt und durch die Abstände hindurchläuft, die zwischen den Bauteilen gebildet sind; wobei die Trennbauteile (2) gegenüber dem Rahmen (1) benachbart zu der stromaufwärts gelegenen Walze (4) durch eine Befestigung der Bauteile an dem Rahmen (1) festgehalten sind, **dadurch gekennzeichnet, dass** vor der stromaufwärts gelegenen Walze die Trennbauteile (2) gegenüber dem Rahmen (1) durch ein an dem Rahmen (1) befestigtes rotierendes Bauteil (12) festgehalten werden, wobei das Bauteil Schaufeln (13) einschließt, die zum Halten der Trennbauteile an ihrem Platz bei einer Drehung des Bauteils (12) ausgebildet sind.

2. Trennvorrichtung nach Anspruch 1, **dadurch ge-**

- kennzeichnet, dass** die Schaufeln (13) durch eine Wechselwirkung mit den vorspringenden Teilen (11 b) der Zähne (11) in Drehung angetrieben werden.
3. Trennvorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Enden der Schaufeln (13) mit einer abwechselnden Folge von Kerben (13a) und Zungen (13b) versehen ist, wobei die Folge derart ist, dass die Kerben (13a) ein jeweiliges Trennbauteil (2) umgreifen können und die Zungen (13b) in einem jeweiligen Raum zwischen den Bauteilen angeordnet werden können. 5
 4. Trennvorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** das rotierende Bauteil (12) eine Welle (14) einschließt, dessen Enden auf dem Rahmen (1) mit Hilfe eines jeweiligen Lagers (16) befestigt sind, wobei jede Schaufel (13) durch eine Klappe gebildet ist, die in Radialrichtung mit der Walze (14) verbunden ist. 10
 5. Trennvorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Förderband (3) mit Reihen von Zähnen (11) versehen ist, die sich in Querrichtung über die volle Breite der Trennanordnung (7) erstrecken. 15
 6. Trennvorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die Winkelversetzung zwischen den Schaufeln (13) derart ist, dass die Länge des Bogens, der zwischen zwei benachbarten Schaufeln gebildet wird, gleich dem Abstand zwischen zwei benachbarten Reihen von Zähnen (11) ist. 20
 7. Trennvorrichtung nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** die Zähne (11) einer Reihe einen gemeinsamen Basisteil (11 a) aufweisen, der den Raum (10) in Abschnitte zur Aufnahme des hindurch gelangenden Ernteteils unterteilt. 25
 8. Trennvorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die vorspringenden Teile (11 b) einen Anstellwinkel aufweisen, der in Richtung auf die Schaufeln (13) ausgerichtet ist. 30
 9. Trennvorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Trennbauteile (12) aus Stangen gebildet sind, die einen kreisförmigen Querschnitt aufweisen. 35
 10. Trennvorrichtung nach Anspruch 9, **dadurch gekennzeichnet, dass** die Enden der Stangen benachbart zu der stromabwärts gelegenen Walze (5) abwechselnd in Längsrichtung versetzt sind. 40
 11. Trennvorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Raum (10) für die Aufnahme des hindurch gelangenden Teils zur Bildung eines abgedichteten Förderer-Bettes bis zur stromabwärts gelegenen Walze (5) des Teils ausgebildet ist. 45
 12. System zur Reinigung eines Erntematerialstroms, unter Einschluss einer Trennvorrichtung nach einem der vorhergehenden Ansprüche, wobei das System weiterhin eine stromabwärts gelegene Saugvorrichtung (18) einschließt, die über der Trennvorrichtung angeordnet ist, um zumindest einen Teil des festgehaltenen Erntematerial-Teils aufzusaugen. 50
 13. Reinigungssystem nach Anspruch 12, **dadurch gekennzeichnet, dass** es weiterhin einen Einfülltrichter (20) zur Zuführung des Erntematerialstromes an die Trennvorrichtung einschließt. 55
 14. Reinigungssystem nach Anspruch 13, **dadurch gekennzeichnet, dass** es eine stromaufwärts gelegene Saugvorrichtung (21) einschließt, die zum Ansaugen eines Teils des Erntematerialstromes ausgebildet ist, der von dem Behälter (20) zugeführt wird.
 15. Reinigungssystem nach Anspruch 14, **dadurch gekennzeichnet, dass** die stromaufwärts gelegene Saugvorrichtung (21) hinter dem rotierenden Bauteil (12) vorgesehen ist.
 16. Reinigungssystem nach einem der Ansprüche 13 bis 15, **dadurch gekennzeichnet, dass** der Einfülltrichter (20) zumindest eine vordere Öffnung (22) einschließt, in der der Saugeinlass der stromaufwärts gelegenen Saugvorrichtung (21) angeordnet ist, wobei die Öffnung mit einem Schredder (23) versehen ist.
 17. Reinigungssystem nach einem der Ansprüche 13 bis 16, **dadurch gekennzeichnet, dass** der Behälter (20) zumindest einen oberen Erntematerial-Kippbereich (25) einschließt, wobei die Wand unterhalb des Bereiches mit einer Rampe (26) versehen ist, die durch Schneiden und Anheben eines Teils der Wand gebildet ist.
 18. Frucht-Erntemaschine, die eine motorisierte Tragsstruktur und ein Erntesystem einschließt, das auf der Struktur befestigt ist, wobei das Erntesystem zum Lösen des Erntematerials ausgebildet ist, wobei die Maschine weiterhin ein Reinigungssystem nach einem der Ansprüche 13 bis 17 einschließt und das System mit dem Erntematerialstrom gespeist wird, der von dem Erntesystem kommt.
 19. Frucht-Erntemaschine nach Anspruch 18, **dadurch gekennzeichnet, dass** sie einen Einfülltrichter einschließt, in den der Erntematerialstrom-Teil, der hin-

durch gelangt, und der Erntematerialstrom-Teil, der nach dem Absaugen festgehalten wird, gekippt werden.

20. Frucht-Erntemaschine nach Anspruch 18, **dadurch gekennzeichnet, dass** sie weiterhin ein Verteilungssystem einschließt, das mit zumindest dem Erntematerialstrom-Teil gespeist wird, der nach dem Absaugen festgehalten wird.

21. Frucht-Erntemaschine nach Anspruch 20, **dadurch gekennzeichnet, dass** das Verteilungssystem eine Trennvorrichtung nach einem der Ansprüche 1 bis 11 umfasst.

Revendications

1. Dispositif de séparation d'un flux de produit récolté, ledit dispositif étant destiné à être embarqué dans une machine récolteuse de fruits, ledit dispositif comprenant:

un châssis (1) et des éléments de séparation longitudinaux (2) qui sont solidarisés longitudinalement audit châssis en étant espacés transversalement les uns des autres de sorte à former un réseau (7)) permettant de séparer le flux de récolte entre une portion retenue sur ledit réseau et une portion traversante ledit réseau, et un convoyeur à tapis (3) qui est motorisé selon une direction longitudinale entre un axe amont (4) et un axe aval (5) solidaires dudit châssis, ledit tapis étant disposé sous les éléments de séparation (2) pour fournir entre le tapis et les éléments un espace de réception (10) de la portion traversante, ledit tapis étant pourvu de dents (11) présentant une partie de base (11a) qui s'étend dans l'espace de réception (10) et une partie saillante (11b) qui s'étend au-dessus des éléments de séparation (2) en traversant les espaces formés entre lesdits éléments, les éléments de séparation (2) étant retenus par rapport au châssis (1), de façon adjacente à l'axe amont (4), en fixant lesdits éléments au châssis (1), **caractérisé en ce qu'en** avant du dit axe amont, les éléments de séparation (2) sont retenus par rapport au châssis (1) par un organe rotatif (12) monté sur le châssis (1), ledit organe comprenant des pales (13) qui sont agencées pour maintenir en position les éléments de séparation (2) lors de la rotation dudit organe (12).

2. Dispositif de séparation selon la revendication 1, **caractérisé en ce que** les pâles (13) sont déplacées en rotation par interaction avec les parties saillantes (11b) des dents (11).

3. Dispositif de séparation selon la revendication 1 ou 2, **caractérisé en ce que** l'extrémité des pales (13) est pourvue d'une succession alternée d'encoches (13a) et de crans (13b), ladite succession étant agencée pour que les encoches (13a) puissent entourer respectivement un élément de séparation (2) et que les crans (13b) puissent être disposés dans respectivement un espace formé entre lesdits éléments.

4. Dispositif de séparation selon la revendication 3, **caractérisé en ce que** l'organe rotatif (12) comprend un axe (14) dont chaque côté est monté sur le châssis (1) par l'intermédiaire de respectivement un palier (16), chaque pale (13) étant formée d'un rabat associé radialement à l'axe (14).

5. Dispositif de séparation selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le tapis (3) est pourvu de rangées de dents (11) qui s'étendent transversalement sur toute la largeur du réseau de séparation (7).

6. Dispositif de séparation selon la revendication 5, **caractérisé en ce que** l'écart angulaire entre les pales (13) est tel que la longueur de l'arc formé entre deux pales adjacentes est égale à la distance séparant deux rangées adjacentes de dents (11).

7. Dispositif de séparation selon la revendication 5 ou 6, **caractérisé en ce que** les dents (11) d'une rangée présentent une partie de base (11a) commune, ladite partie compartimentant l'espace de réception (10) de la portion traversante de récolte.

8. Dispositif de séparation selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les parties saillantes (11b) présentent un angle d'attaque orienté vers les pales (13).

9. Dispositif de séparation selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les éléments de séparation (2) sont formés de tiges présentant une section de révolution.

10. Dispositif de séparation selon la revendication 9, **caractérisé en ce que** les bouts libres des tiges jouxtant l'axe aval (5) sont décalés longitudinalement de façon alternée.

11. Dispositif de séparation selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'espace de réception (10) de la portion traversante est agencé pour former un lit étanche de transport jusqu'à l'axe aval (5) de ladite portion.

12. Système de nettoyage d'un flux de récolte comprenant un dispositif de séparation selon l'une quelcon-

que des revendications précédentes, ledit système comprenant en outre un dispositif d'aspiration aval (18) qui est disposé au-dessus du dispositif de séparation de sorte à aspirer au moins une partie de la portion de flux de récolte retenue.

5

ractérisé en ce que le système d'égrappage comprend un dispositif de séparation selon l'une quelconque des revendications 1 à 11.

13. Système de nettoyage selon la revendication 12, **caractérisé en ce qu'il** comprend en outre une trémie d'alimentation (20) du dispositif de séparation avec le flux de produit récolté.

10

14. Système de nettoyage selon la revendication 13, **caractérisé en ce qu'il** comprend un dispositif d'aspiration amont (21), ledit dispositif étant prévu pour aspirer une partie du flux de récolte alimenté par la trémie (20).

15

15. Système de nettoyage selon la revendication 14, **caractérisé en ce que** le dispositif d'aspiration amont (21) est prévu derrière l'organe rotatif (12).

20

16. Système de nettoyage selon l'une quelconque des revendications 13 à 15, **caractérisé en ce que** la trémie (20) comprend au moins une ouverture frontale (22) dans laquelle la bouche d'aspiration du dispositif d'aspiration amont (21) est disposée, ladite ouverture étant équipée d'un broyeur (23).

25

17. Système de nettoyage selon l'une quelconque des revendications 13 à 16, **caractérisé en ce que** la trémie (20) comprend au moins une surface supérieure de déversement de récolte (25), la paroi sous ladite surface étant pourvue d'un tremplin (26) formé par découpe et relèvement d'une partie de ladite paroi.

30

35

18. Machine récolteuse de fruits comprenant une structure porteuse motorisée et un ensemble de récolte monté sur ladite structure, ledit ensemble de récolte étant agencé pour détacher la récolte, ladite machine comprenant en outre un système de nettoyage selon l'une quelconque des revendications 13 à 17, ledit système étant alimenté en flux de récolte provenant de l'ensemble de récolte.

40

45

19. Machine récolteuse selon la revendication 18, **caractérisée en ce qu'elle** comprend une benne dans laquelle la portion traversante de flux de récolte ainsi que la portion de flux retenue après aspiration sont déversées.

50

20. Machine récolteuse selon la revendication 18, **caractérisé en ce qu'elle** comprend en outre un système d'égrappage, ledit système étant alimenté avec au moins la portion de flux retenue après aspiration.

55

21. Machine récolteuse selon la revendication 20, **ca-**

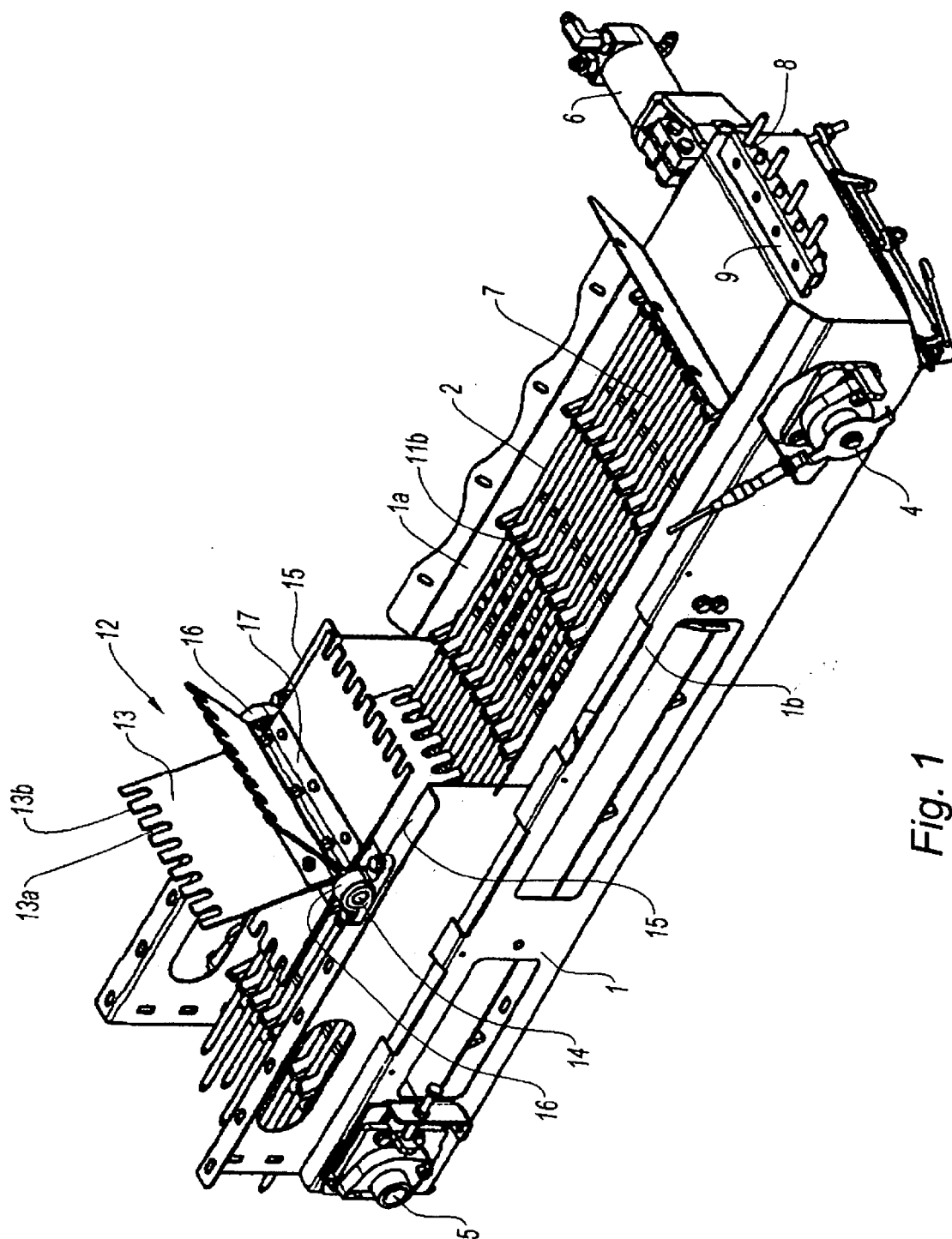
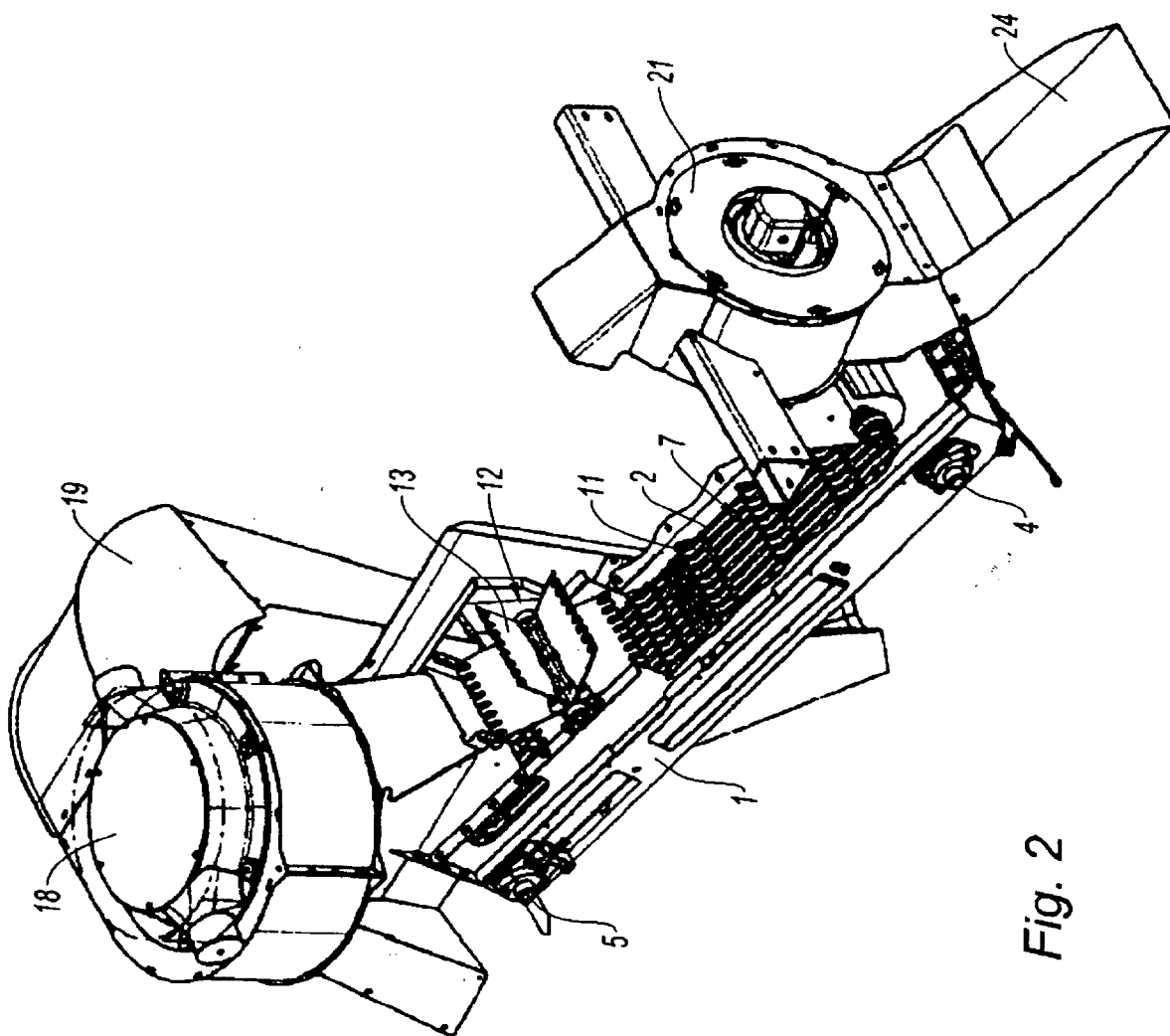


Fig. 1



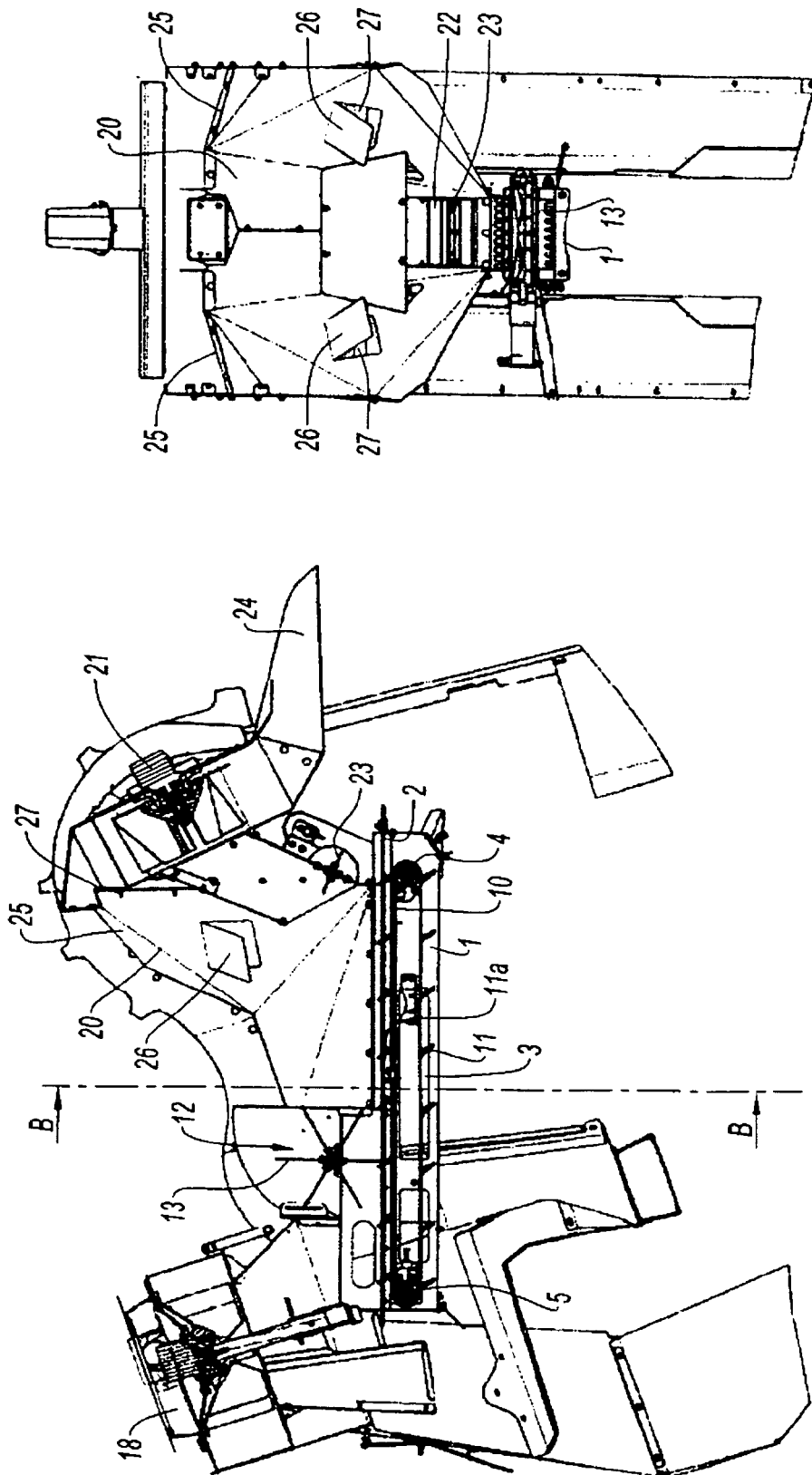


Fig. 3a

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1192850 A [0007]
- EP 1336333 A [0007]
- EP 1002467 A [0047]